aggrecan synthesis indicates that activated ERK does not always serve as a negative regulator of proteoglycan synthesis [3].

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MECHANICAL COMPRESSION EFFECTS ON NO PRODUCTION AND MATRIX ALTERATION IN HUMAN OA CARTILAGE EXPLANTS UNDER DIFFERENT OXYGEN TENSIONS

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Purpose: Several factors are known to be involved in the destruction of the articular cartilage. Interleukin-1β (IL-1β) plays a determinant role in the pathogenesis of osteoarthritis (OA) by stimulating inducible NO synthase (iNOS), cyclo-oxygenase II (COX-II) and proteases. During normal activity, articular cartilage is subject to dynamic loading applied perpendicular to the cartilage surface. Compression causes deformation of cells and of extracellular matrix (ECM), gradients in hydrostatic pressure and intratissue fluid flow. These mechanical changes can also alter chondrocyte behaviour and ECM homeostasis. The present study was designed to evaluate in-vitro effects of intermittent compression on NO and GAG release by human OA cartilage explants.
Methods: Cartilage explants were exposed to intermittent compression (1 MPa, 1 Hz, 30' ON, 30' OFF) for 7 hours under normoxia (21% O_2) or hypoxia (5% O_2). NO production and GAG release in culture medium were measured for each condition. Moreover, matrix structure was analysed by second harmonic generation (SHG) imaging in a confocal microscope after multiphoton exitation.
Results: Results show that mechanical stimulation increase NO and GAG release in culture media under normoxia or hypoxia conditions. The increase of NO and GAG release in response to mechanical stimulation was more important under normoxia than under hypoxia conditions. Moreover, the collagen network was altered after compression as showed by SHG images.
Conclusions: The results suggest that oxygen tension influenced the response of cells to mechanical stimulation. The in vitro response of osteoarthritic cartilage is more important under normoxia than under hypoxia conditions. In vitro models may help to explain aspects of the interactions between mechanical forces and degradative pathways which lead to cartilage damage and disease progression.
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EFFECT OF HYDROSTATIC PRESSURE ON ULTRASTRUCTURE OF SYNOVIAL FIBROBLASTS FROM RAT TEMPOROMANDIBULAR JOINT

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Purpose: Mechanical loading of the cartilage and bilaminal zone is the important role in the pathogenesis and progression of temporomandibular disorders (TMD). However, the synoviocytes in bilaminal zone, however, the earliest pathological TMD cartilage changes are likely to result from continuous loading of joint cartilage as the patterns of TMD. This project examines the effect of hydrostatic pressure on ultrastructure of synovial fibroblastic cells from the condyle of rat temporomandibular joint.
Methods: Synovial fibroblastic cells derived from the double condyle of rat temporomandibular joint were grown to confluency in DMEM medium supplemented with 10% fetal calf serum. The monolayer of fibroblasts was then subjected to different hydrostatic pressure (30kPa, 60kPa, and 90kPa) in a computer-controlled pressure chamber or 12 h. Changes of ultrastructure were observed by transmission electron microscope.
Results: The inner-structure of normal SF was normal and intact. At 30 kPa, the ultrastructure of SF mostly shows that the chromatin was condensated lightly and ruptured to the nuclear margin. Intracellular vacuoles were observed increased visibly. At 60 kPa, the karyon takes on crescent and the mitochondria seem varicose. At 90 kPa, the apoptosis-like body was wrapped by membrane and embedded in the high density chromatin.
Conclusions: These data suggested that biomechanical stress could induce the apoptosis and result in the change of ultrastructure of synovial fibroblasts from rat temporomandibular joint.

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COMPLEX THERMAL PROPERTIES OF HUMAN CARTILAGE IN GRADE 4 OSTEOARTHRITIS

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Purpose: The purpose of this study was to further characterize the altered metabolism in human degenerated cartilage that promotes disease progression. A new protocol had to be established before the investigation. The specific causes of osteoarthritis are unknown, but are believed to be a result of both mechanical and molecular events in the affected joint. Much of what is known about changes in the extracellular matrix in osteoarthritis comes from animal models.
The change of energy in thermal processes can be measured by Differential scanning calorimetry (DSC). A limited number of papers have been published before on the subject of thermal analysis of normal and osteoarthritic human hyaline cartilage. Previously, thermogravimetric methods have not been used for compositional thermoanalytical study of normal and degenerative human hyaline cartilage.
Methods: The thermal properties of samples were determined by differential scanning calorimetry. From the DSC curves the decomposition temperature, the transition temperature range and the total calorimetric enthalpy change were calculated. The thermogravimetric analysis was performed and the TG, DTG and DTA curves were determined.
During arthroplasty procedures performed at the University of Szeged, degenerative Grade 4 human hyaline cartilage was obtained from 15 hip. All tissues were yielded in accordance to legal regulation, international ethical concerns, and patients' consent.
Results: It was found, that the total water content of the osteoarthritic samples was 86.5%, and 50kJ/M energy was used for the removal of the fluid content. In the osteoarthritic samples (average mass: 17.02 mg), 0.242 mg decrease was measured which represents 1.4% °C-1 mass reduction. The resulting amount of weight lost in the linear region was recounted from these results.
With the rise of temperature an endothermic reaction was ob-